



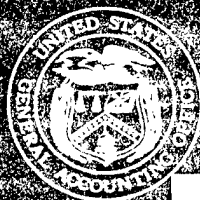
United States General Accounting Office

Report to the Honorable
Jeff Bingaman, U.S. Senate

November 1991

STRATEGIC DEFENSE INITIATIVE

Options for Revising Program Elements Used to Fund Program



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National Security and
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November 1, 1991

The Honorable Jeff Bingaman
United States Senate

Dear Senator Bingaman:

This letter responds to your January 31, 1991, request and subsequent discussion with your office that we (1) suggest alternatives to the program elements used to fund the fiscal year 1991 budget for the Strategic Defense Initiative Organization (SDIO) and (2) discuss ways in which Congress can establish control over SDIO funding.

Background

SDIO's research and development funds for the Strategic Defense Initiative (SDI) program and for the Tactical Missile Defense Initiative are budgeted, authorized, and appropriated through the research, development, test and evaluation account for defense agencies. SDIO's total budget authority for SDI research and development for fiscal year 1991 is divided among five program elements, each of which funds certain SDI projects. Originally, SDIO's research was funded through fiscal year 1990 from five technology-based program elements. However, in fiscal year 1991 the National Defense Authorization Act replaced these five program elements with five new mission-based program elements. In addition, for fiscal year 1991, the House Committee on Appropriations initiated the Tactical Missile Defense Initiative, which SDIO manages for the Department of Defense (DOD). It is funded under a separate program element. (See table 1.)

Table 1: List of Program Elements

Technology-based (Pre-fiscal year 1991)	Mission-based (Fiscal year 1991)
Surveillance, acquisition, tracking and kill assessment	Phase I defenses
Directed energy weapons	Limited protection systems
Kinetic energy weapons	Theater and antitactical ballistic missile defenses
Systems analysis and battle management	Follow-on systems
Survivability, lethality, and key technologies	Research and support activities
	Tactical Missile Defense Initiative

Congress created the new mission-based program elements when SDIO's near-term mission was to develop a Phase I Strategic Defense System. The Phase I System was primarily intended to deter a ballistic missile attack from the Soviet Union. However, in January 1991 President Bush announced a new focus for the SDI program—Global Protection Against Limited Strikes (GPALS). The focus of the new program is to provide global protection against limited, unauthorized, or accidental ballistic missile attacks.

The GPALS architecture¹ contains three missions: (1) global defenses, (2) national defenses, and (3) theater defenses. Global defenses is centered around the space-based Brilliant Pebbles interceptor and is intended to provide protection worldwide. National defenses is intended to protect the United States using ground-based sensors and interceptors and the space-based sensor called Brilliant Eyes. Theater defenses is intended to provide a rapidly deployable and relocatable defense for U.S. forces and U.S. allies in any theater.

Results in Brief

The mission-based program elements used for fiscal year 1991 do not accurately reflect the new GPALS focus of the SDI program. SDIO officials and we each identified an alternative option for revising the program elements. The major differences between SDIO's option and ours are (1) where to fund 30 technology development projects totaling about \$2 billion and (2) whether to have a separate program element for funding 34 SDIO projects used to fund the management of the total program and integration and support services. SDIO's option distributes the technology projects among the program elements, whereas our option includes one program element for technologies that support GPALS and one for the other technologies. Our option also has a separate program element to fund management.

Congress may establish control over SDIO funding by (1) limiting the total appropriation and allowing SDIO to distribute the funds among the program elements, (2) allocating the appropriation among each program element, or (3) setting funding amounts for specific projects in a program element.

¹Architecture refers to the system functions, the system elements that are needed to perform those functions, and the performance levels that are needed for the elements.

Options for Revising SDIO Program Elements

As a result of the decision to refocus the SDI program, the program elements used for fiscal year 1991 do not reflect the current GPALS structure of the program. We compared the program elements introduced in fiscal year 1991 with SDIO's proposal and with another option we developed. Table 2 summarizes how SDIO's fiscal year 1992 budget request was distributed among the program elements established in fiscal year 1991, as well as SDIO's option and GAO's option. Appendix I provides a more detailed breakdown of the three options and shows the proposed funding source for SDIO's 75 projects under each option.

Table 2: Alternative Options for SDIO Program Elements for Fiscal Year 1992

Dollars in millions

Program elements currently used

Missions and functions	Phase I defenses	LPS^a	Theater	Follow-on systems	Research and support	TMDI^b
GPALS global	\$703.3					
GPALS national	502.9	\$447.5				
GPALS theater			\$83.6			\$508.0
Technologies	343.5	203.5	87.2	\$925.1	\$438.9	
Management and support	62.5	23.5	108.7		642.4	
Total	\$1,612.3	\$674.4	\$279.5	\$925.1	\$1,081.3	\$508.0

SDIO's alternative program elements

Missions and functions	GPALS global	GPALS national	GPALS theater^c	Follow-on systems	Research and support
GPALS global	\$703.3				
GPALS national		\$950.4			
GPALS theater			\$591.6		
Technologies	123.9	423.1	87.2	\$925.1	\$438.9
Management and support		86.0	108.7		642.4
Total	\$827.2	\$1,459.5	\$787.5	\$925.1	\$1,081.3

GAO's alternative program elements

Missions and functions	GPALS global	GPALS national	GPALS theater^c	GPALS technology	Other technology	Management and support
GPALS global	\$703.3					
GPALS national		\$950.4				
GPALS theater			\$591.6			
Technologies				\$1,381.9	\$616.3	
Management and support						\$837.1
Total	\$703.3	\$950.4	\$591.6	\$1,381.9	\$616.3	\$837.1

Notes: Does not include military construction or Department of Energy direct appropriations. Totals may not add due to rounding.

^aLPS is Limited Protection Systems.

^bTMDI is Tactical Missile Defense Initiative.

^cCombines the theater and TMDI program elements used in fiscal year 1991.

The program elements created in fiscal year 1991 were geared toward developing Phase I of a Strategic Defense System, which was intended to deter massive ballistic missile attacks by the Soviet Union. The shift to the GPALS mission has changed the status of the Phase I Strategic Defense System concept from being the main near-term objective to

being a possible follow-on system concept. Both SDIO and we have developed program elements that would reflect the GPALS focus of the SDI program. However, SDIO's fiscal year 1992 budget request was submitted to Congress using the fiscal year 1991 program elements.

SDIO's Option

SDIO proposed five program elements, as shown in table 2. In addition, SDIO retained the follow-on systems program element and the research and support activities program element that were used for the fiscal year 1991 budget.

The GPALS global defenses program element includes programs, projects, and activities intended to develop systems, components, and architectures for a space-based global intercept capability, according to SDIO. Specifically, the GPALS global defenses program element contains projects directed toward deploying Brilliant Pebbles interceptors.

The GPALS national defenses program element includes programs, projects, and activities intended to develop systems, components, and architectures to provide the United States with ground-based defenses against strategic ballistic missiles. SDIO includes spaced-based and ground-based sensors, in addition to ground-based interceptors, in this program element.

SDIO combined its fiscal year 1991 theater and antitactical ballistic missile defenses program element and the Tactical Missile Defense Initiative program element to create the GPALS theater defenses program element. It would fund projects intended to develop systems, components, and architectures for deployable and rapidly relocatable antitactical ballistic missile defenses. The program element includes projects conducted in cooperation with friendly and allied nations to develop theater defenses against tactical ballistic missiles.

SDIO's set of proposed program elements also retains the follow-on systems program element and the research and support activities program element, which were used in fiscal year 1991. SDIO's follow-on systems program element is primarily intended to fund technology development projects that would be deployed after the initial GPALS architecture. SDIO's research and support activities program element includes a combination of technology development projects and management and support activities.

GAO's Option

Our option revised the program elements to make them GPALS mission-oriented. The first three program elements reflect the GPALS missions—global, national, and theater defenses, just as SDIO's do. However, we dropped SDIO's other two program elements and created three new ones: (1) GPALS technology, (2) other technology, and (3) management and support. (See table 2.)

The GPALS technology program element would fund those technology development programs that would contribute to the development of the weapon and sensor systems in the GPALS elements. Separating the technology projects from the three GPALS elements would avoid dividing up the funding for projects that require full funding to proceed. If a technology project were necessary only for projects in one program element, then the funding for it could come from that program element. However, in some cases the projects support system elements in more than one of the three GPALS program elements. For example, the discrimination technology, which is being developed in project number 1105, is expected to provide support for system elements in both the GPALS global and GPALS national defenses program elements. (See app. I.) SDIO could judgmentally allocate a portion of the funding to each of the projects, as it has done. However, if Congress were to decide not to fund one of the program elements, the loss of funds from that program element would leave inadequate funding to carry out the project.

Non-GPALS technology projects would be funded from another program element called other technology. Examples of these technology projects are directed energy weapons, innovative science and technology, and small business innovative research projects.

Our management and support program element would contain all projects that deal with managing the SDI program and providing integration and support services, such as systems analysis. In SDIO's option, these projects would be distributed among the national defenses, theater defenses, and research and support activities program elements. Dividing the funding for management projects among the GPALS mission program elements has the same difficulties as for technology projects.

Congressional Controls Over SDIO Funding and DOD Reprogramming Authority

Congress has the option for three levels of control, regardless of which program elements it chooses: (1) limiting the total appropriation and allowing SDIO to distribute the funds among the program elements, (2) allocating the appropriation among each program element, or (3) setting funding amounts for specific projects in a program element.

At the first level, Congress could set an overall funding limit on the SDI program, allowing SDIO to divide the funds among the program elements. For example, setting the SDI budget at \$2.89 billion is the most general level of control. This level of control provides Congress the least amount of control and provides SDIO with the most flexibility.

Congress could also control funds at the program element level. This would allow Congress to emphasize specific elements of the GPALS system, instead of the program as a whole. For example, Congress could specify an amount for the GPALS theater defenses program element to ensure that the theater component of GPALS is funded at a particular level.

The most detailed level of control consists of specifying funding limits on individual projects. Setting ceilings or floors would allow Congress to ensure that projects it supports receive the desired level of funding. For example, Congress could specify the amount of funds to be spent solely on directed energy weapons within a program element.

DOD Reprogramming Authority

Even though Congress has established its controls over funding, SDIO can still transfer funds among program elements and among projects within each program element, subject to reprogramming rules. DOD guidance on reprogramming of research, development, test and evaluation funds are provided in the Department of Defense Budget Guidance Manual. The manual contains DOD's policies on reprogramming proposals and actions relating to the appropriation accounts covered by the DOD Appropriations Act and explains how to implement those policies, covering the various reprogramming actions, forms, and procedures.

Under DOD reprogramming guidance for research, development, test and evaluation accounts, SDIO can shift up to \$3.9 million from one program element to another. When the cumulative reprogrammed amount for that program element reaches \$4 million, SDIO must ask for congressional permission to reprogram. SDIO can, however, transfer funds between projects within a program element without notifying anyone unless Congress has placed a control on a project.

Scope and Methodology

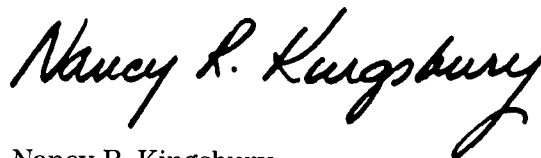
We obtained documents and interviewed officials from SDIO. We based our alternative program elements on SDIO documents and discussions with agency officials. SDIO uses a work breakdown structure as a tool for managing the SDI program. We used that structure, the task descriptions from the program management agreements,² and the SDIO program network diagrams as our primary tools for setting up alternative program elements. The Program Assessment Center is responsible for creating and updating the program network diagrams, which graphically depict the relationships among all major activities in the SDI program.

We conducted our review from February through September 1991 in accordance with generally accepted government auditing standards. We did not obtain written agency comments. However, we discussed the contents of this report with the appropriate SDIO officials, who agreed with the factual information.

We are sending copies of this report to the Chairmen, House and Senate Committees on Appropriations and on Armed Services; the Secretary of Defense; the Director, Office of Management and Budget; and the Director, Strategic Defense Initiative Organization. We will also make copies available to others.

Please contact me at (202) 275-4268 if you or your staff have any questions concerning this report. Other major contributors to this report were Norman J. Rabkin, Associate Director; J. Klein Spencer, Assistant Director; and Paula J. Haurilesko, Evaluator-in-Charge.

Sincerely yours,



Nancy R. Kingsbury
Director
Air Force Issues

²Program management agreements describe the responsibilities of the executing agency for each project.

Distribution of SDI Projects Under Alternative Options for Program Elements

SDIO's fiscal year 1992 request								
Project number	Project title	Total	Phase I	Limited	Theater	TMDI	Follow-on	Support
Technologies (1000)								
Sensor technologies								
1101	Passive Sensors	\$54.0	\$50.0				\$4.0	
1102	Radar	18.0	18.0					
1103	Laser Radar	61.0	15.5				45.5	
1104	Signal Processing	72.0	67.0				5.0	
1105	Discrimination	154.7	29.9	\$124.7				
1106	Sensor Studies & Experiments	189.6	111.5	72.7	\$5.5			
1107	Interactive Discrimination	10.0					10.0	
Subtotal		559.2	291.9	197.4	5.5	0	64.5	0
Interceptor technologies								
1201	Interceptor Component Technology	149.0					149.0	
1202	Interceptor Integration Technology	155.0	15.5				139.5	
1203	Hypervelocity Technology	20.0					20.0	
1204	Interceptor Studies & Analysis	42.0					18.0	\$24.0
1205	Foreign Technology Support	51.2			51.2			
1206	Theater Interceptors	10.0			10.0			
Subtotal		427.2	15.5	0	61.2	0	326.5	24.0
Directed energy technologies								
1301	Free Electron Laser (FEL)	27.0					27.0	
1302	Chemical Laser	131.5					131.5	
1303	Neutral Particle Beam	131.5					131.5	
1304	Nuclear Directed Energy Weapon (NDEW)	15.0					15.0	
1305	Acquisition, Tracking, Planning/Fire Control	105.0					105.0	
1306	Theater Directed Energy Weapon	5.0			5.0			
Subtotal		415.0	0	0	5.0	0	410.0	0
BM/C3 technologies								
1403	Computer Engineering	0.7						0.7
1405	Communications Engineering	10.5					8.2	2.3
Subtotal		11.3	0	0	0	0	8.2	3.0

Appendix I
Distribution of SDI Projects Under
Alternative Options for Program Elements

SDIO's alternative program elements					GAO's alternative program elements					
Global	National	Theater	Follow-on	Support	Global	National	Theater	GPALS technology	Tech-nology	Manage-ment
\$5.4	\$44.6		\$4.0					\$54.0		
	18.0							18.0		
2.4	13.1		45.5					61.0		
16.2	50.8		5.0					72.0		
29.9	124.7							154.7		
38.4	145.7	\$5.5						189.6		
			10.0					10.0		
92.3	397.0	5.5	64.5	0	0	0	0	559.2	0	0
			149.0					149.0		
15.5			139.5					155.0		
			20.0						\$20.0	
			18.0	\$24.0				42.0		
		51.2						51.2		
		10.0						10.0		
15.5	0	61.2	326.5	24.0	0	0	0	407.2	20.0	0
			27.0						27.0	
			131.5						131.5	
			131.5						131.5	
			15.0						15.0	
			105.0						105.0	
		5.0							5.0	
0	0	5.0	410.0	0	0	0	0	0	415.0	0
				0.7				0.7		
			8.2	2.3				10.5		
0	0	0	8.2	3.0	0	0	0	11.3	0	0

(continued)

**Appendix I
Distribution of SDI Projects Under
Alternative Options for Program Elements**

			SDIO's fiscal year 1992 request					
Project number	Project title	Total	Phase I	Limited	Theater	TMDI	Follow-on	Support
Key technologies								
1501	Survivability	\$123.3	\$16.1	\$2.5	\$5.5			\$99.2
1502	Lethality & Target Hardening	63.0	0		10.0		\$5.0	48.0
1503	Power & Power Conditioning	102.8					24.0	78.8
1504	Materials & Structures	58.2					11.1	47.1
1505	Space Transportation Technologies	32.3	5.3				27.0	
Subtotal		379.5	21.4	2.5	15.5	0	67.1	273.1
Innovative technologies								
1601	Innovative Science & Technology	90.7						90.7
1602	Small Business Innovative Research							
1603	New Concepts Development	30.7					30.7	
Subtotal		121.5	0	0	0	0	30.7	90.7
Test operations								
1701	Launch Services	16.6	10.4				6.2	
1702	Special Test Activities	48.0						48.0
Subtotal		64.6	10.4	0	0	0	6.2	48.0
Total for technologies		\$1,978.3	\$339.1	\$199.9	\$87.2	0	\$913.3	\$438.9

Elements (2000)

Elements									
2102	Brilliant Eyes	243.9	243.9						
2103	Ground-Based Surveillance & Tracking System	180.7		180.7					
2104	Ground-Based Radar	73.4	15.0		58.4				
2201	Space-Based Interceptor	17.0		17.0					
2202	Ground-Based Interceptor	207.6		207.6					
2203	Endo-Exoatmospheric Interceptor	259.0	244.0		15.0				
2204	Directed Energy Weapon (DEW) Systems	10.4					10.4		
2205	Brilliant Pebbles	659.1	659.1						
2300	Command Center	96.5	44.1	42.2	10.3				
2304	Software Engineering	8.0	4.4	3.6					

**Appendix I
Distribution of SDI Projects Under
Alternative Options for Program Elements**

SDIO's alternative program elements					GAO's alternative program elements					
Global	National	Theater	Follow-on	Support	Global	National	Theater	GPALS technology	Technology	Management
\$16.1	\$2.5	\$5.5		\$99.2				\$123.3		
		10.0	\$5.0	48.0				63.0		
			24.0	78.8				102.8		
			11.1	47.1				58.2		
	5.3		27.0					32.3		
16.1	7.8	15.5	67.1	273.1	0	0	0	379.5	0	0
				83.0					\$83.0	
			30.7	7.7					38.4	
0	0	0	30.7	90.7	0	0	0	0	121.5	0
	10.4		6.2					16.6		
				48.0					48.0	
0	10.4	0	6.2	48.0	0	0	0	16.6	48.0	0
\$123.9	\$415.1	\$87.2	\$913.3	\$438.9	0	0	0	\$1,373.9	\$604.5	0
	243.9					\$243.9				
	180.7					180.7				
	15.0	58.4				15.0	\$58.4			
	17.0					17.0				
	207.6					207.6				
	244.0	15.0				244.0	15.0			
			10.4						10.4	
659.1					\$659.1					
44.1	42.2	10.3			44.1	42.2	10.3			
	8.0							8.0		

(continued)

Appendix I
Distribution of SDI Projects Under
Alternative Options for Program Elements

Project number	Project title	Total	SDIO's fiscal year 1992 request					Follow-on	Support
			Phase I	Limited	Theater	TMDI			
TMDI	Tactical Missile Defense Initiative	\$508.0				\$508.0			
Total for elements		\$2,263.7	\$1,210.6	\$451.1	\$83.6	\$508.0	\$10.4		0
Integration & support (3000)									
Systems engineering									
3102	Engineering & Integration	83.0	44.7	10.0	16.4				12.0
3104	Integrated Logistics Support (ILS)	6.7							6.7
3105	Producibility & Manufacturing	14.8							14.8
3107	Environment, Siting, & Facilities	6.2							6.2
3108	Operational Environments	1.0							1.0
3109	System Security	12.0	8.5	3.5					
3110	Survivability Engineering	4.0							4.0
3111	Surveillance Engineering	10.0	4.0	6.0					
Subtotal		137.8	57.2	19.5	16.4	0	0		44.8
Systems analysis									
3201	Architecture Studies	7.3							7.3
3202	Operations Interface	6.0							6.0
3203	Threat Development	10.4							10.4
3204	Countermeasures	22.9							22.9
3205	Theater Missile Defense Spec. Studies	53.0			53.0				
3206	System Threat	7.3							7.3
3282	Operational Planning	0.6							0.6
3292	Offense/Defense Analysis	0.6							0.6
Subtotal		108.1	0	0	53.0	0	0		55.1

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Distribution of SDI Projects Under
Alternative Options for Program Elements

SDIO's alternative program elements					GAO's alternative program elements					
Global	National	Theater	Follow-on	Support	Global	National	Theater	GPALS technology	Technology	Management
		\$508.0					\$508.0			
\$703.3	\$958.4	\$591.6	\$10.4	0	\$703.3	\$950.4	\$591.6	\$8.0	\$10.4	0
	54.7	16.4		\$12.0						\$83.0
				6.7						6.7
				14.8						14.8
				6.2						6.2
				1.0						1.0
	12.0									12.0
				4.0						4.0
	10.0									10.0
0	76.7	16.4	0	44.8	0	0	0	0	0	137.8
				7.3						7.3
				6.0						6.0
				10.4						10.4
				22.9						22.9
		53.0								53.0
				7.3						7.3
				0.6						0.6
				0.6						0.6
0	0	53.0	0	55.1	0	0	0	0	0	108.1

(continued)

Appendix I
Distribution of SDI Projects Under
Alternative Options for Program Elements

			SDIO's fiscal year 1992 request					
Project number	Project title	Total	Phase I	Limited	Theater	TMDI	Follow-on	Support
Test and evaluation								
3302	National Test Bed	\$124.6						\$124.6
3303	Independent T/E Oversight	6.0						6.0
3304	Targets	105.1						105.1
3305	Theater Test Bed	39.3			\$39.3			
3306	Advanced Research Center (ARC)	28.7						28.7
3308	System Simulator	9.3	\$5.4	\$4.0				
Subtotal		312.9	5.4	4.0	39.3	0	0	264.3
Total for integration & support		\$558.8	\$62.5	\$23.5	\$108.7	0	0	\$364.1
Management (4000)								
Program management								
4100	Operation Support Costs	7.2						7.2
4101	Operations Support	150.0						150.0
4103	Planning	12.4						12.4
4104	Fiscal Pay	37.7						37.7
4106	Audit	0.4						0.4
4107	Information Management	13.4						13.4
Subtotal		221.2	0	0	0	0	0	221.2
Engineering management								
4201	Systems Engineering Management	12.0						12.0
4202	Systems Analysis Management	13.5						13.5
Subtotal		25.5	0	0	0	0	0	25.5
Technology management								
4302	Technology Transfer	2.5						2.5
4305	Medical Technology	1.5					\$1.5	
Subtotal		4.0	0	0	0	0	1.5	2.5
Project management								
4401	Interface Management	10.9						10.9
4402	Elements Management	18.2						18.2
Subtotal		29.1	0	0	0	0	0	29.1
Total for management		\$279.8	0	0	0	0	\$1.5	\$278.3
Total for SDIO and TMDI		\$5,080.6	\$1,612.3	\$674.4	\$279.5	\$508.0	\$925.1	\$1,081.3

Appendix I
Distribution of SDI Projects Under
Alternative Options for Program Elements

SDIO's alternative program elements					GAO's alternative program elements					
Global	National	Theater	Follow-on	Support	Global	National	Theater	GPALS technology	Tech-nology	Management
				\$124.6						\$124.6
				6.0						6.0
				105.1						105.1
		\$39.3								39.3
				28.7						28.7
	\$9.3									9.3
0	9.3	39.3	0	264.3	0	0	0	0	0	312.9
0	\$86.0	\$108.7	0	\$364.1	0	0	0	0	0	\$558.8
				7.2						7.2
				150.0						150.0
				12.4						12.4
				37.7						37.7
				0.4						0.4
				13.4						13.4
0	0	0	0	221.2	0	0	0	0	0	221.2
				12.0						12.0
				13.5						13.5
0	0	0	0	25.5	0	0	0	0	0	25.5
				2.5						2.5
			\$1.5						\$1.5	
0	0	0	1.5	2.5	0	0	0	0	1.5	2.5
				10.9						10.9
				18.2						18.2
0	0	0	0	29.1	0	0	0	0	0	29.1
0	0	0	\$1.5	\$278.3	0	0	0	0	\$1.5	\$278.3
\$827.2	\$1,459.5	\$787.5	\$925.1	\$1,081.3	\$703.3	\$950.4	\$591.6	\$1,381.9	\$616.3	\$837.1

Note: Totals may not add due to rounding. Includes only funds for the demonstration/validation phase.